Evolving DDR Platform

Mobile

Andrew Lin

Strategic Marketing Manager, Acer Labs Inc.

Jimmy Chiu

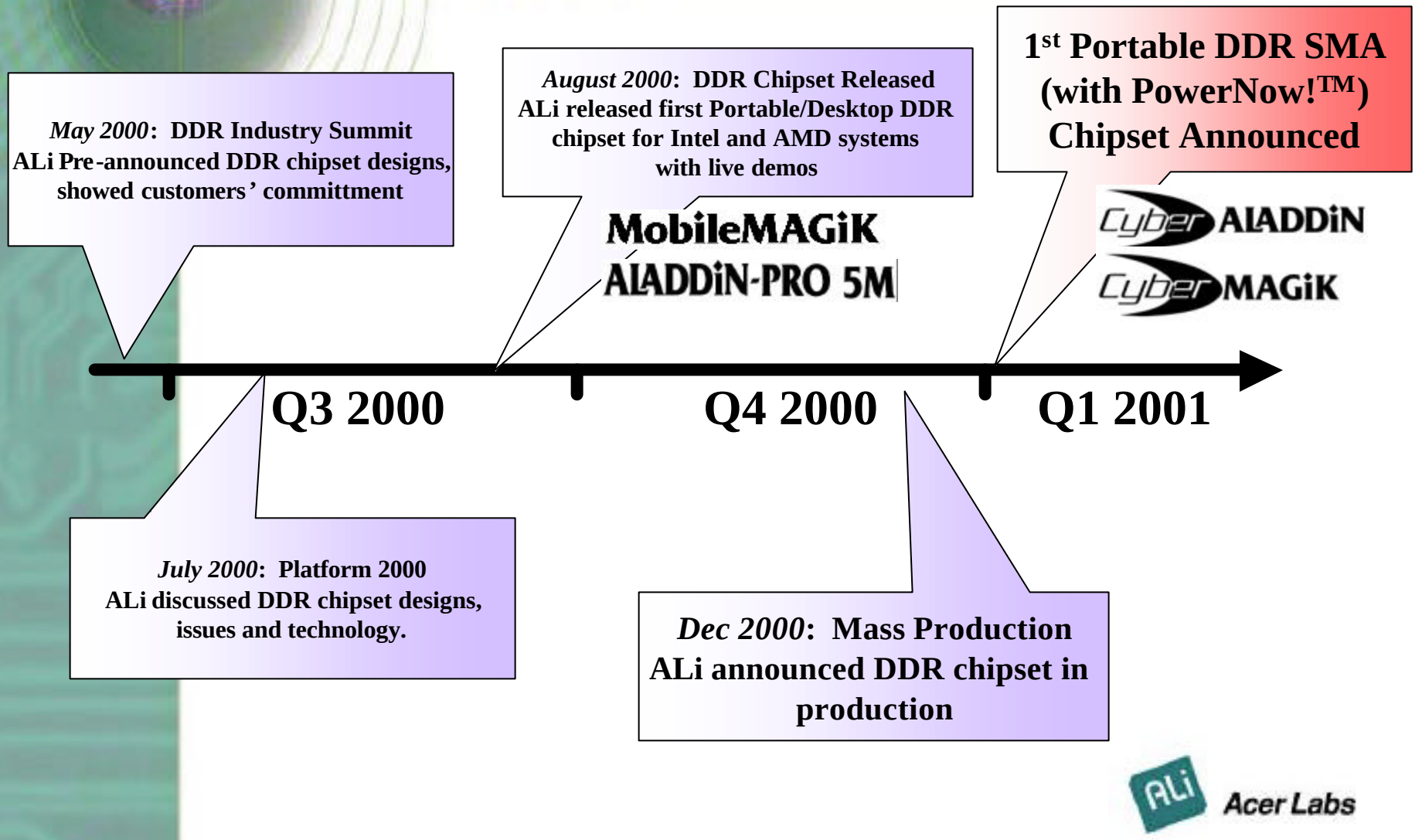
Assistant VP, Trident Microsystem

Acer Labs

Agenda

- ALI DDR Commitment
- ALI DDR Chipset Market Positioning
  - DDR Review
  - ALi's DDR Chipset Offerings
- Introducing First Portable DDR SMA (with PowerNow!™) Chipsets
  - For AMD Socket A CPUs
  - For Intel Socket 370 CPUs
- Conclusion

ALi's DDR Commitment



ALi Acer Labs

Key Features: DDR vs SDR

	DDR	SDR (PC133)
Clock Frequency	up to 133MHz differential clock	up to 133MHz single-ended clock
Bandwidth	2 Gbytes/sec	1 Gbytes/sec
Signal Level	2.5V SSTL-2	3.3V LVTTL
Synchronization	Source synchronous Read: edge-aligned Write: center-aligned	Global clock
Bus Terminator	Serial + Parallel resistor	N/A
Input PAD	Pseudo differential	Single-ended
CAS Latency	Read: 2/2.5 Write: 1	Read: 2/3 Write: 0
SO-DIMM (portable) Mechanicals	200 pins Same footprint as 144-pin PC-133 SO-DIMM	144 pins

Acer Labs

ALi's DDR Chipset Offerings

MobileMAGiK ALADDiN-PRO 5M

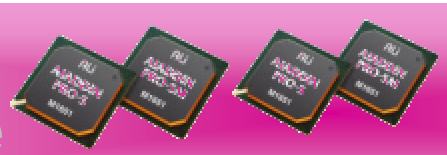
M1647 M1651

- 1st SDR/DDR chipset for both AMD and Intel CPUs for mainstream PCs
  - Leading chipsets for AMD Mobile Athlon CPUs and Intel Portable CPUs
  - 1st Mobile DDR chipset
- 1st Mobile Athlon chipset with PowerNow!™ Technology
- 1st to support Athlon with FSB 266
- Commonality of driver across the board for future integration path and continuous graphics core

ALi Acer Labs

ALi's Current Mobile Chipset Position

Performance



Stand alone MobileMAGiK & ALADDiN Pro5M

CyberMAGiK &CyberALADDiN with DDR memory

Mainstream

CyberMAGiK & CyberALADDiN with SDR memory

Value

ALADDiN CyberBlade i1

DDR SO-DIMM Compatibility List

- Micron
- Samsung
- Hitachi (Elpida)
- Hyundai
- More in progress...

Acer Labs

Introducing ...

World 1st Portable DDR SMA (w. PowerNow!™) Chipsets

- 1st mobile DDR chipset with 128 bit 3D graphic integration for both AMD and Intel CPUs.
- Same proven core logic features with

MobileMAGiK ALADDiN-PRO 5M

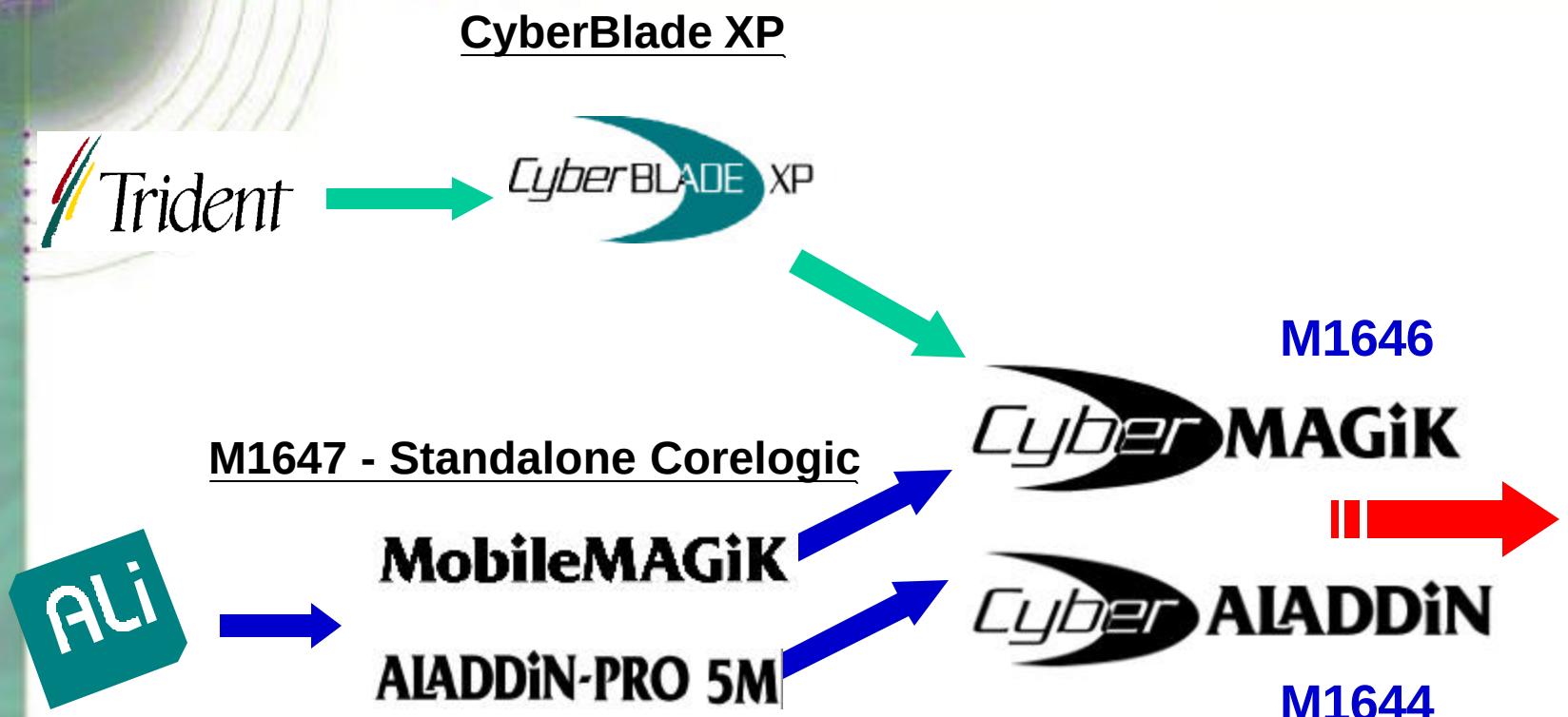
- Cover the value, mainstream and the performance segment

CyberMAGiK for AMD Athlon AMD Duron

CyberALADDiN for intel CPUs

ALi Acer Labs

Marriage of Proven Technologies



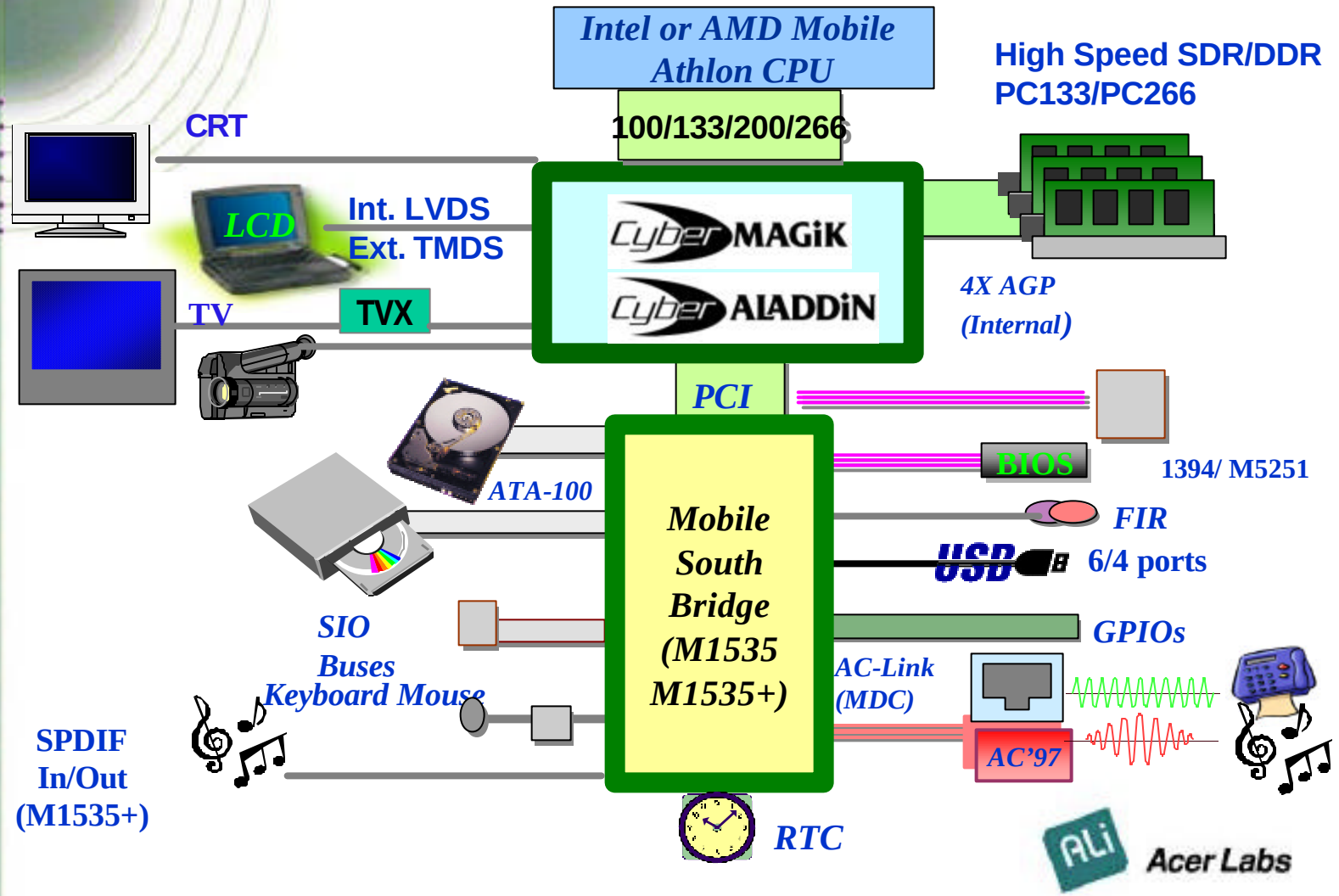
M1651 - Standalone Corelogic

4xAGP, PC133 and DDR

BIOS: 1121a load advance default

Acer Labs

ALi's Mobile DDR SMA Platform



Why choose CyberMAGiK & CyberALADDiN

- Cost Benefits
- Power Benefits
- Performance Benefits
  - Core Logic
  - Graphics

Acer Labs

Cost Benefits

- Low component count to optimize system cost
- SDR Platform for value segment can be leveraged to DDR Platform for mainstream & performance segments to reduce engineering cost

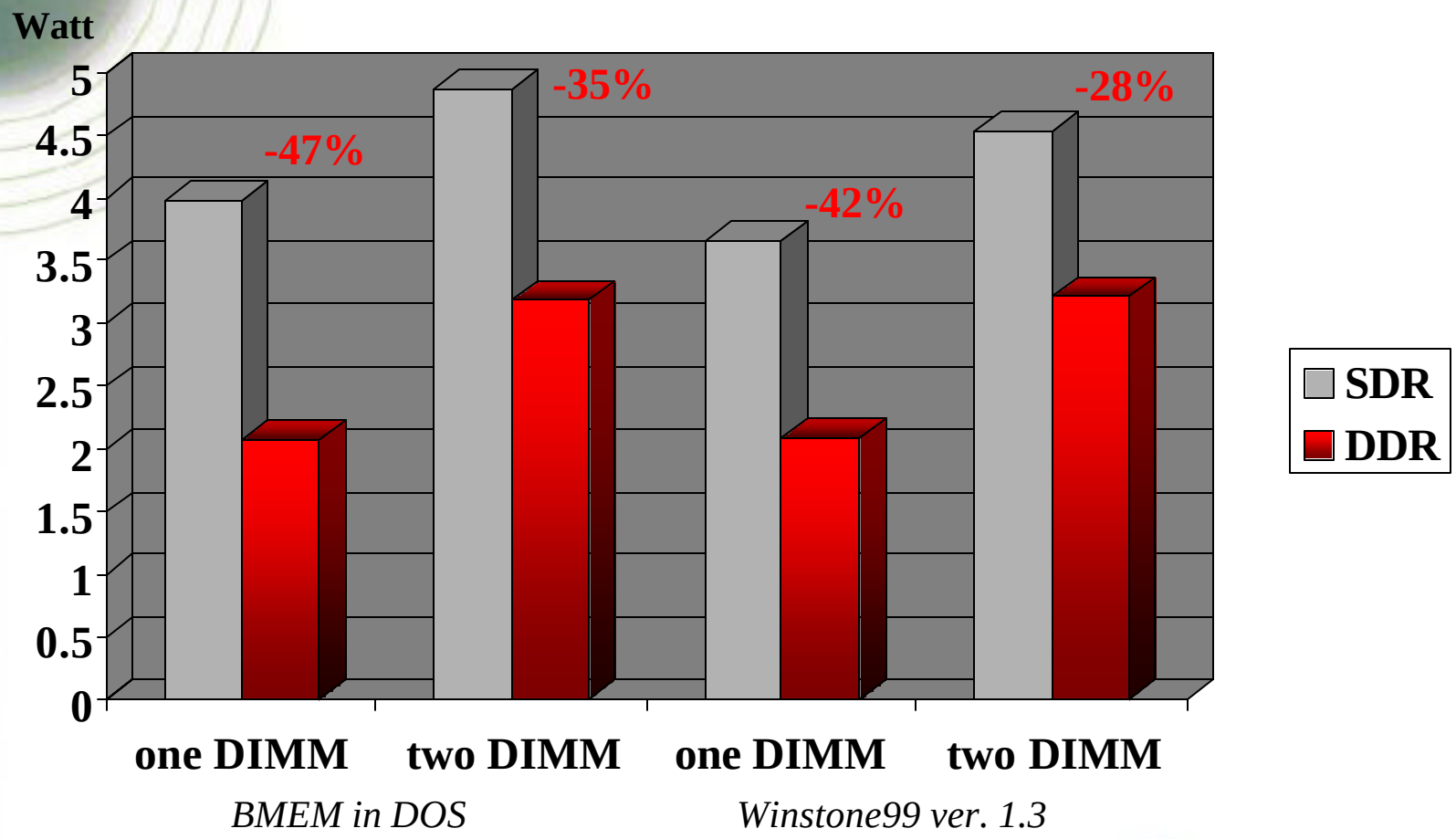
Acer Labs

Power Benefits

- DDR operates in lower voltage (2.5V) than SDR (3.3V)
- PowerNow!™, ACPI, SMI, SMM, SMBus for optimum power management

Acer Labs

Power Comparison: DDR vs SDR



Acer Labs

Best Power Management Southbridge Solution

For Design Flexibility and Extended Battery Life

- ACPI 1.0 and 1.0b Compliant
- SMBus 1.0 and 2.0 compliant
- SMM & SMI Support including SMM Legacy
- Extensive GPIO and Extended GPIO
- PCI Clock run# and Dynamic Stop Clock
- Hot Key and Watch Dog Timer
- Extensive External Wake-up States
- Extensive Timers and System Activity Monitoring
- PowerOn-Suspend, Suspend-to-Disk, Suspend-to-DRAM
- Support 8-Mbit ROM size

ALi Acer Labs

Driving for High Performance

Key Features Highlights:

- 266 MHz Double Data Rate (DDR) memory support (2.1 GBytes/sec), PC2100
- SMA 128-bit Architecture with DDR to improve bandwidth
- 200/266 MHz (AMD) FSB & 133 MHz (Intel) FSB support
- DX7.0 Compatible Graphics Accelerator (CyberBlade XP 128-bit Core)
- Proven Building Blocks from ALi and Trident
- Integrated LVDS for LCD panel up to UXGA
- Complies with PC99 and PC2001 spec.

ALi Acer Labs

Summary: Highest Level of Integration for Mobile Platform

CyberMAGiK, CyberALADDiN

- 128 bit Dual-Pipe 3D / 2D Graphics
- DVD /MPEG 2 with Motion Comp and iDCT
- LVDS Integration
- Intel™ Mobile Processor Supported
- Supports 4,16,64,128, 256, 512-Mbit SDRAM and/or DDR
- Supports 6 memory rows per byte access on each row
- Supports LVTTL/SSTL signal level
- Dynamic switching CKE algorithm for low power
- Shared Memory Interface: 4MB, 8MB, 16MB, 32MB **(no frame buffer required)**
- PowerNow!™, ACPI, SMI, SMM support
- 555 Pin BGA (35mmx35mm)

M1535+ Mobile Southbridge

- Support Ultra DMA Mode Transfers upto Mode 5 timing (100 Mbytes/sec - ATA 100)
- Consumer SPDIF Input/Output
- Six (6) USB ports with two (2) USB controllers based on OpenHCI 1.0a specification
- ACPI 1.0/1.0b, SMBus support
- AC-Link Host controller compliant with AC'97 2.1
- HSP Modem Solution
- Hardware SoundBlaster Pro/16 compatible legacy audio
- 352-pin (27mmx27mm) BGA package

Trident ALi Acer Labs

Trident Microsystems

- 14 yrs in Graphics business since 1987
- 1997: First DVD solution for Desktop PC
- 1999: First Graphics + Core Logic for Notebook
- 2000: First DX 7.0 solution for Notebook
- 2001: First Graphics + Core Logic with DDR
- Claim-to-fame: Performance Per Watt

Acer Labs

Major OEM / ODM Notebooks

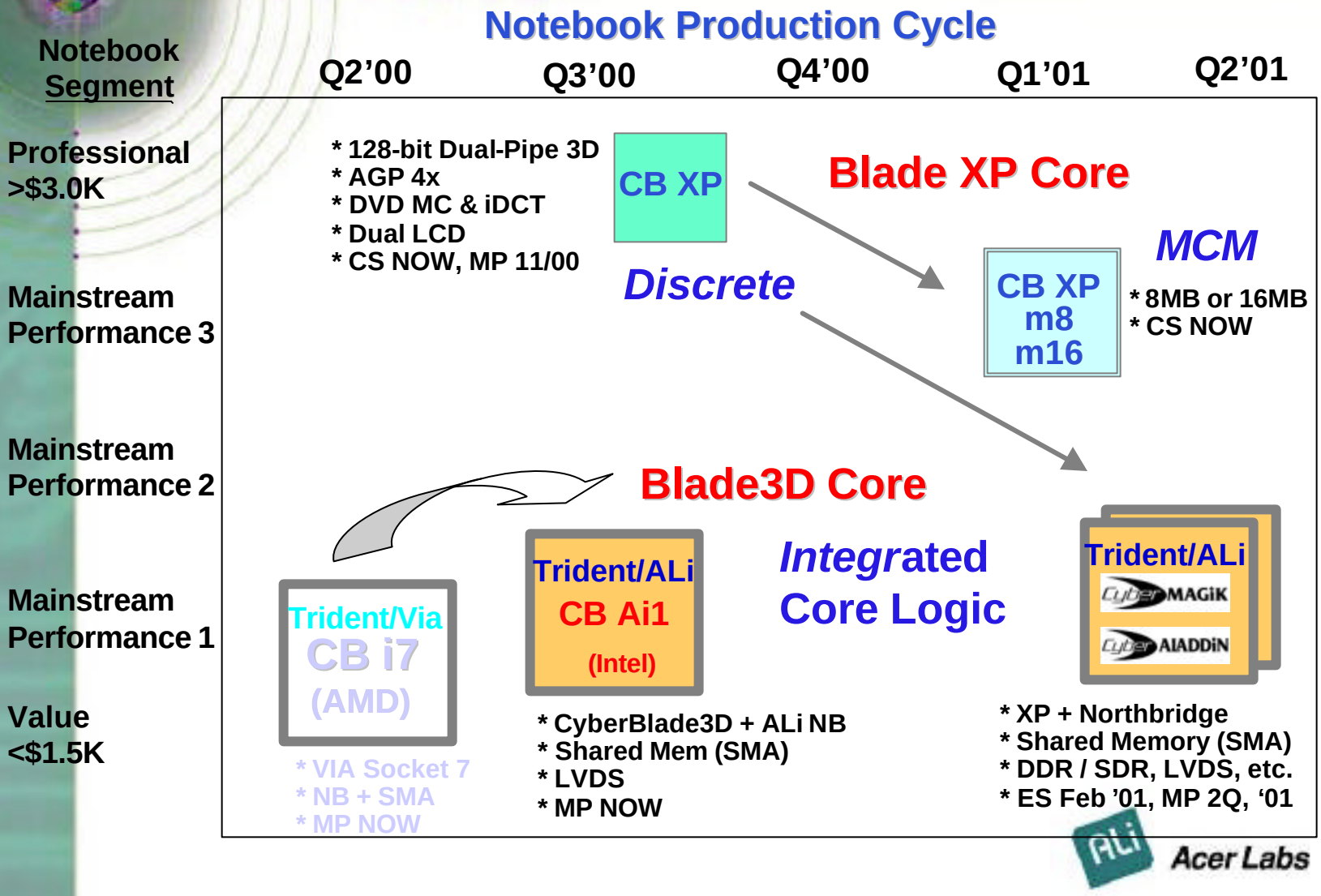
Powered By Trident 3D Graphics

ALi Acer Labs

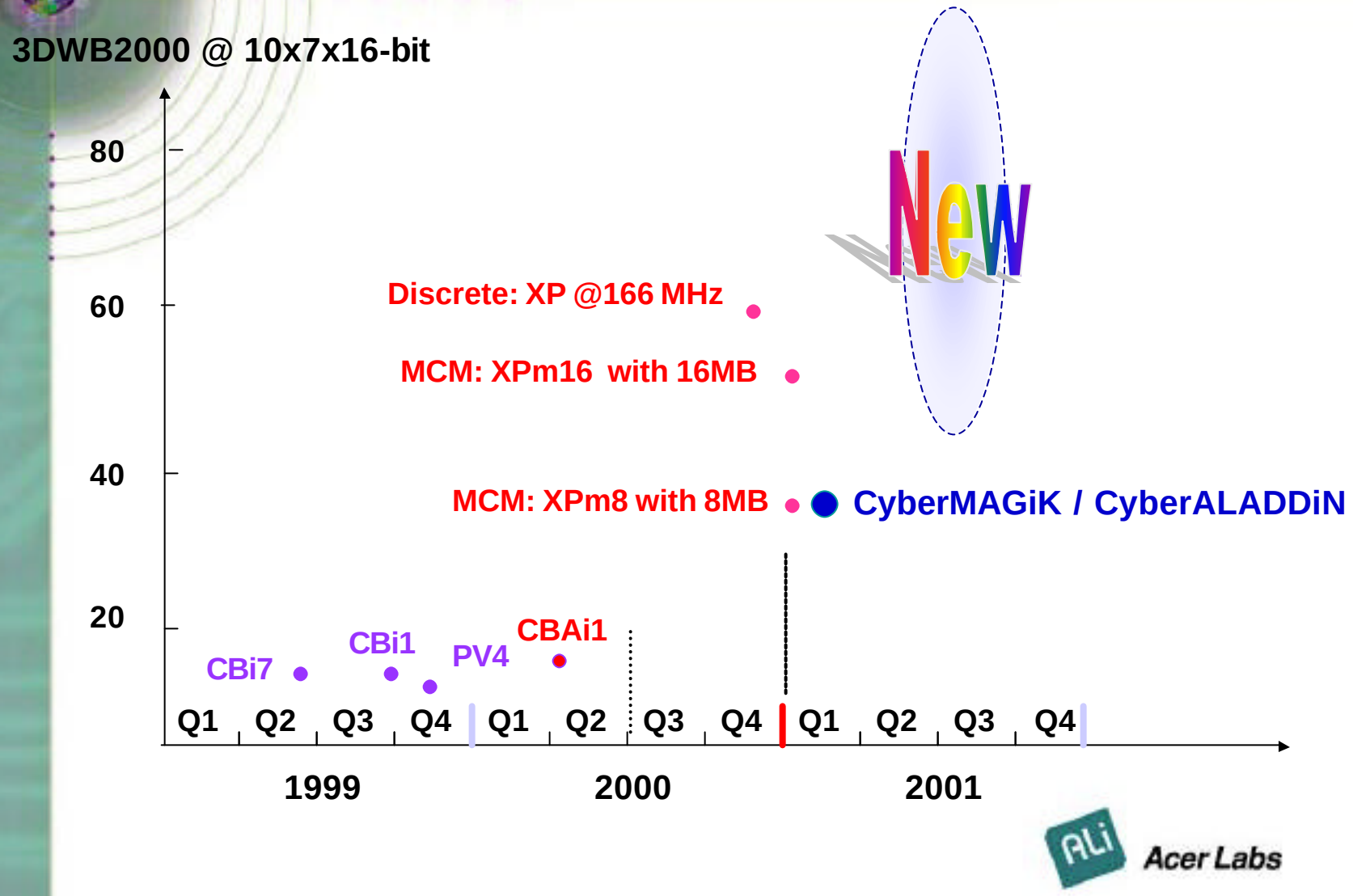
Notebook Trends

- Expansion of Integrated Graphics/Core Logic Solutions into Mainstream Systems
- TFT LCD's with Enhanced Resolutions and Sizes
- System Memory Migrating to DDR
  - Price parity with SDR
- Desktop Gaming Experience on Notebook

Notebook Roadmap



Performance Roadmap



Blade XP Core

- Graphics Core for CyberMAGiK and CyberALADDiN
- DirectX 7.0 with Cubic Mapping hardware
- Power dissipation: 1.6 w (max), 0.5 w (static)
- Integrated LVDS driver with DSTN support
- Up to 1600x1200 UXGA resolution for LCD panel
- Dual Panel interface
- State-of-the-art Video De-Interlacing
- Frame buffer from 4 to 32 MB
- 128-bit internal memory interface
- Performance: 2.5X of competition

3D Overview

	Blade XP	Blade3D
API Support in HW		
DirectX 7.0	**Yes**	-
OpenGL 1.2	**Yes**	-
Engine Hardware		
Transformation	**SW**	-
Lighting	**SW + HW**	-
Setup Engine	**32-bit FP**	FP / Integer
Primitive Engine	**32-bit FP**	Integer
Pixel Rendering Pipelines	**Dual 128-bit**	Single 64-bit
Accelerated Lighting		
Phong Lighting (per pixel)	**Yes**	-
Reflections & refractions	**Yes**	-
Multiple Lights	**Yes**	-
Guard Band Clipping	**X and Y**	X only

3D Rendering

	Blade XP	Blade3D
Lighting Model	**Diffuse / Specular**	Diffuse / Specular
Shading Model		
Enhanced Gouraud	**Yes**	Yes
Phong-quality	**Yes**	--
Color Format	**16 / 24 / 32-bit**	16/24/32
Z-Buffering	**16 / 24 / 32-bit**	16-bit
W-Buffering	**16 / 24 / 32-bit**	--
Scene Anti-Aliasing Support	**Yes**	--
Dithering	**Yes**	Yes
Stencil Buffer	**8-bit**	--

3D Texturing

	Blade XP	Blade3D
DirectX 7.0	Yes	--
Single-Pass Cubic Mapping	Yes	--
Single-Pass Bump Mapping	Yes	--
Texture Compression	Yes	Yes
Anisotropic + Trilinear Texture Filtering	Yes	Yes
Texture Size	2K x 2K	1K x 1K
Detail Texture	Yes	--
DirectX 7.0 Multi-Texture Modulate Operations	Yes	--
Multi-Texture Linear Blend Operations	Yes	--
Multi-Texture Add & Combine Operations	Yes	--

3D Texturing (continued)

	Blade XP	Blade3D
Texture Cache	**4 KB**	4 KB
Texture Format		
Palletized	**1, 2, 4, 8 bpp**	1, 2, 4, 8 bpp
Non-Palletized	**16, 32 bpp**	16, 32 bpp
Palette Data Format (ARGB)	**565, 1555, 4444**	565, 1555, 4444
Texture Tiling		
For Textures with 1 or 2 bpp	**16 x 16 or 16 x 8**	8 x 8
For Textures with 4 or 8 bpp	**8 x 8 or 8 x 4**	4 x 4
For Textures with 16 or 32 bpp	**4 x 4 or 4 x 2**	2 x 2
Texturing Features		
Perspective Correct	**Yes**	Yes
Per Pixel MIP-Mapping (based on LOD)	**Yes**	Yes
Transparency (Texture Color Keying)	**Yes**	Yes
Texture Lit, Modulate, Combine	**Yes**	Yes

Video

	Blade XP	Blade3D
Color Space Conversion (YUV to RGB)	**Yes**	Yes
Image Scaling		
Horizontal Interpolation	**Up / Down**	Up / Down
Vertical Interpolation	**Up / Down**	Up / Down
Diagonal Interpolation	**Up / Down**	Up / Down
Edge Recovery	**Yes**	Yes
Full screen Overlay	**Yes**	Yes
Video Capture to Frame Buffer	**Yes**	Yes
Multiple Display Support	**Yes**	Yes
Chroma and Color Keys on Both Windows	**Yes**	Yes
Digital Interface to TV Encoder	**Yes**	Yes

DVD

	Blade XP	Blade3D
THAMA ^{tm} **Technology:**		
Motion Compensation	**Yes**	Yes
IDCT	**Yes**	-
HD0 (1280 x 720 resolution)	**Yes**	-
DVD Player		
Mediamatics	**Yes**	Yes
InterVideo	**Yes**	Yes
De-Interlacing	**Advanced**	Bob & Weave

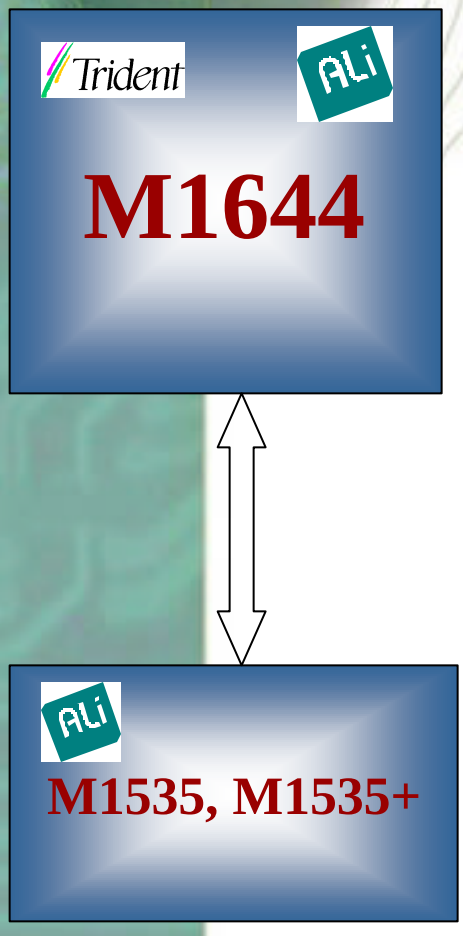
LCD Panel

	Blade XP	Blade3D
Dual Panel Interface	**Yes**	-
First Panel Interface		
TFT Interface	**18/24-bit**	36-bit
Integrated LVDS Drivers	**Yes**	-
DSTN support	**Yes**	-
TMDS Digital Interface		
Bus width	**12-bit**	-
DVI support	**Yes**	-
Frame rate control	**Yes**	Yes
Gamma correction	**Yes**	-
Auto expansion and centering	**Yes**	-
UXGA resolution (1600 x 1200)	**Yes**	-
Spread Spectrum Clocking	**Yes**	-

Performance

	Blade XP	Blade3D
Memory Clock (MHz)	**133 DDR**	133 SDR
Memory Bandwidth (GB/sec)	**2.2**	1.1
Graphics Engine Clock (MHz)	**133**	133
Pixel Per Clock	**2**	1
Pixel Rendering Rate (pixels/sec)	**266 M**	133 M
Texel Access Rate (texels/sec)	**1,064 M**	532 M
DVD Playback Headroom @ 800 MHz P3	**60%**	50%

Intel™ Mobile Chipset Solution



Northbridge: M1644

For all Celeron, Pentium II and Pentium III processors

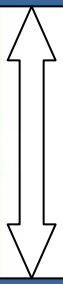
- PC-133 SDR/PC-266 DDR
- Clocks: FSB 66/100/133MHz; Memory 66/100/133MHz
- 4 PCI masters with priority setting
- ACPI, SMI support for optimum power management
- Integrated DX7 compatible graphic core (Trident CyperBlade XP)
  - 128-bit internal datapath, Dual pixel pipes, <= 32-bit depth rendering, Motion Comp.
  - HW-Setup, Lighting, Rendering, and Texturing Engines
  - Integrated single-channel LVDS transmitter,
  - interface to external 12/24-bit TMDS
  - Supports up to 1600X1200 TFT panel and 16/24-bit interface to DSTNs

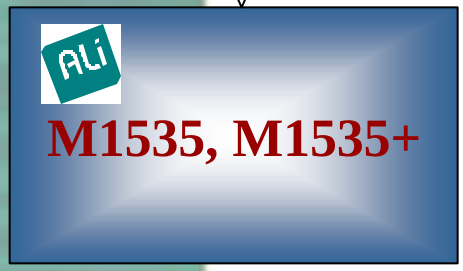
1535, 1535+ Southbridge: **1535 (Available Now)**
1535+(Available Now)

- Integrated SIO
- Ultra 33/66/100
- HW Audio (SB)
- AC-97 Support
- SPDIF
- SW Modem

ALi Acer Labs

AMD™ Mobile Chipset Solution





Northbridge: **M1646**

- AMD K7 Socket-A support
- PC-133 SDR/PC-266 DDR
- Clocks: FSB 200/266MHz; Memory 66/100/133MHz
- 4 PCI masters with priority setting
- PowerNow!™, ACPI, SMI support for optimum power management
- Integrated DX7 compatible graphic core (Trident CyperBlade XP)
  - 128-bit internal datapath, Dual pixel pipes, <= 32-bit depth rendering, Motion Comp.
  - HW-Setup, Lighting, Rendering, and Texturing Engines
  - Integrated single-channel LVDS transmitter,
  - interface to external 12/24-bit TMDS
  - Supports up to 1600X1200 XGA TFT panel and 16/24-bit interface to DSTNs

1535, 1535+ Southbridge: **1535 (Available Now)**
1535+(Available Now)

- Integrated SIO
- Ultra 33/66/100
- HW Audio (SB)
- AC-97 Support
- SPDIF
- SW Modem

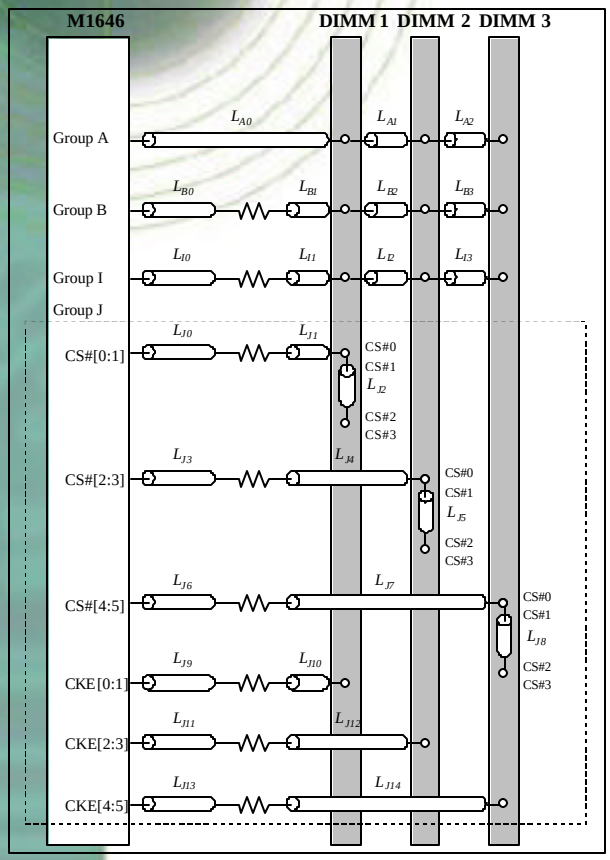
ALi Acer Labs

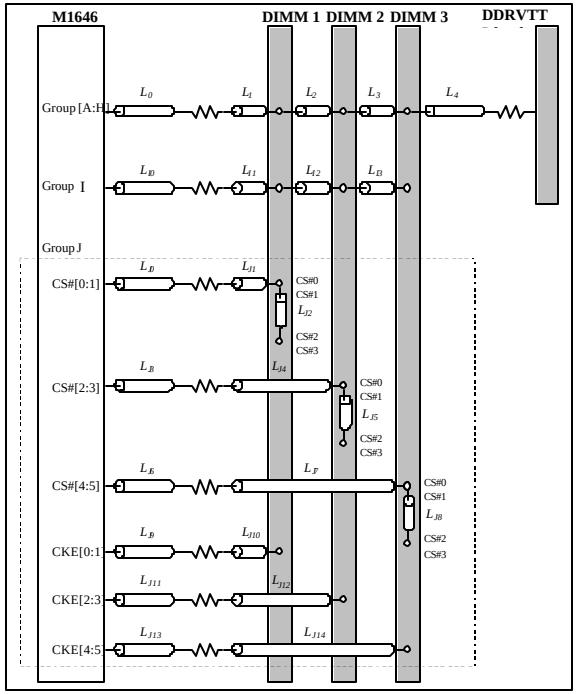
General MB Layout Guidelines

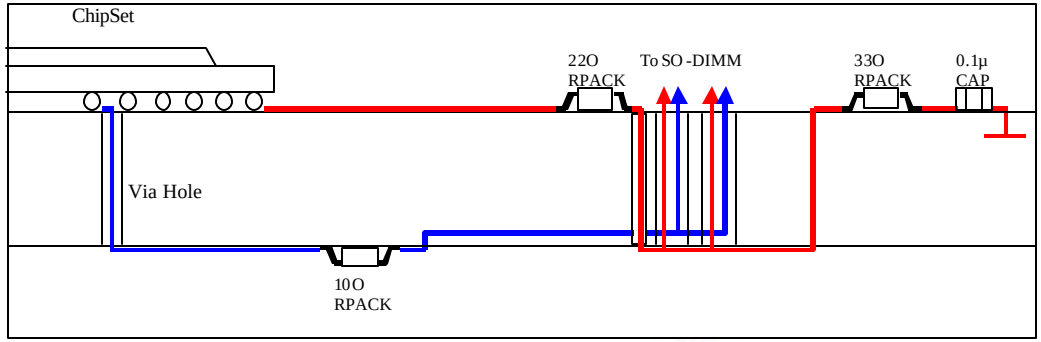
- Do not connect thermal GND pad to big piece of copper on top layer, nor use via holes for V_{CC} and GND
- Maximum trace length difference in each signal-group $\leq$ 100 mils
- Trace length difference between signal-groups should be < 3000 mils
- Trace length of all signals in clock-forwarded signal-group should be within 1000 to 5000 mils
- Watch for “trace width & spacing” between signal-groups
  - Trace width, spacing to others, clearance to itself

Acer Labs

SDR, DDR, SO-DIMM Layout

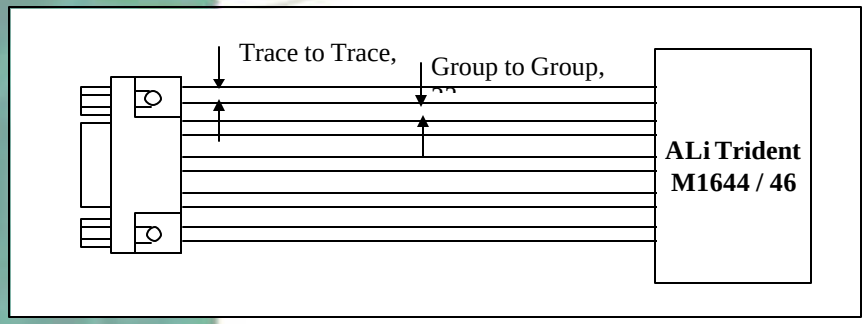


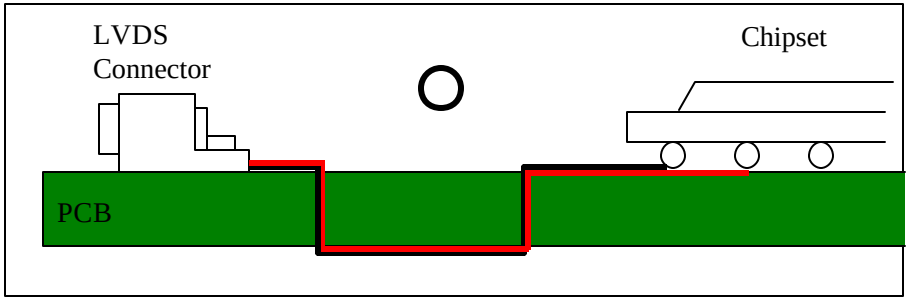


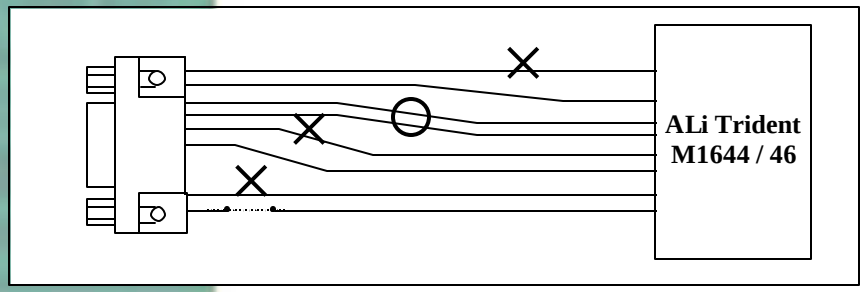


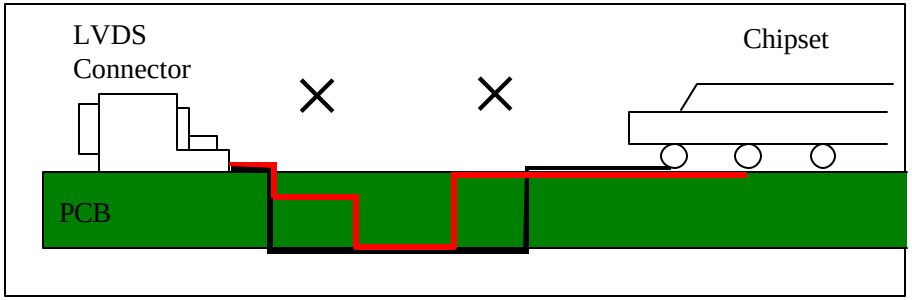
DFP Layout on MB

- **Length difference of each differential pair should be less than 100mil**





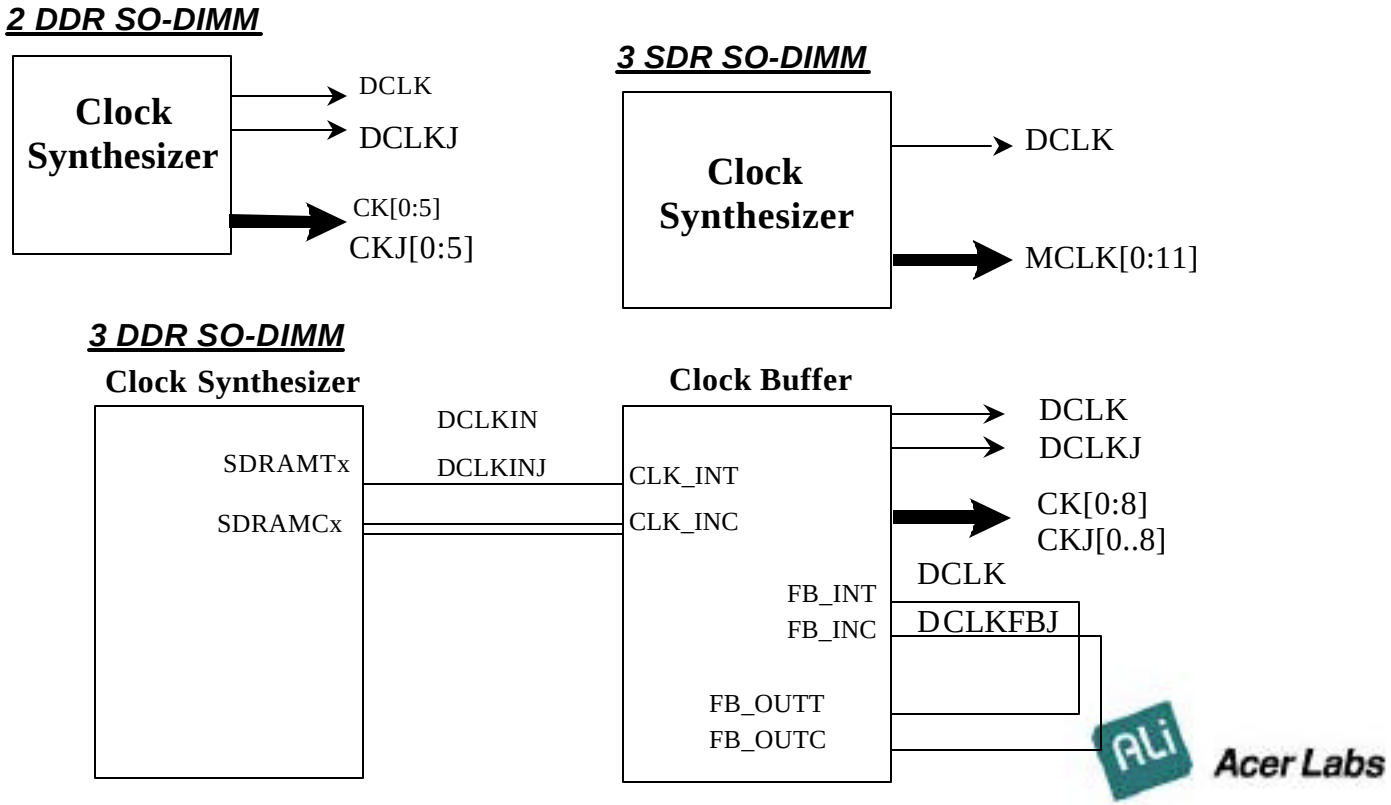




Acer Labs

Clocking for DIMMs

- **Clock Driver for upto 2xDDR modules directly**
- **Clock Driver + Buffer for 3xDDR module**
  - Feedback path length in total trace-length consideration



Conclusion

The choices for mobile DDR platform

- Fully realize the advantages of SMA architecture with DDR technology
- Balances price, power and performance

Acer Labs

Thank You!

Andrew Lin

andrew_cy_lin@ali.com.tw

Acer Labs